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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: MTH 304**

**COURSE TITLE: COMPLEX ANALYSIS I**

**TOTAL: 70 MARKS**

**CREDIT UNIT: 3**

**TIME: 3 HOURS**

**INSTRUCTION: ANSWER ANY 4 QUESTIONS**

1. (a) Let  and , prove that **(5 marks)**

(b) If and, find **(5 marks)**

(c) Write the following expressions in the form,

(i) (ii) **(7 ½ marks)**

2. (a) Let , find the real and imaginary parts of the following complex functions

(i)  (ii) **(10 marks)**

(b) Show that 2(a) (i) and (ii) satisfy the Cauchy-Riemann equations **(7 ½ marks)**

3 (a) Show that the complex function  satisfy harmonic function **(13 marks)**

(b) Verify the Cauchy –Riemann equation for the function  given by

, **(4 ½ marks)**

4 (a) Differentiate the following complex functions from first principles

(i) **(5marks)**

(ii) **(5marks)**

(iii) **(7 ½ marks)**

5 (a) Let, prove that (i)  (**4 marks)**

(ii)  (**4 marks)**

(b) Show that **(9 ½ marks)**

6. (a) Find the values of where and  is

(i) the straight line joining 0 to 

(ii) the imaginary axis from 0 to 

(iii) the line parallel to the real axis from  to **(17 ½ marks)**